Scientific Research Publishing

Open Journal of Epidemiology, 2026, 16(4), 614-629
https://www.scirp.org/journal/ojepi
ISSN Online: 2165-7467
ISSN Print: 2165-7459

Maternal and Facility-Level Factors Influencing Enrolment Time for Early Infant Diagnosis Services at Mama Lucy Kibaki Hospital in Nairobi, Kenya

Chilombe Justus Timothy*, Kiilu Mueke Elizabeth, Ngure Kenneth

School of Public Health, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya
Email: *chilombet@gmail.com

How to cite this paper: Timothy, C.J., Elizabeth, K.M. and Kenneth, N. (2026) Maternal and Facility-Level Factors Influencing Enrolment Time for Early Infant Diagnosis Services at Mama Lucy Kibaki Hospital in Nairobi, Kenya. *Open Journal of Epidemiology*, **16**, 614-629.
https://doi.org/10.4236/ojepi.2026.164041

Received: September 3, 2025
Accepted: November 7, 2026
Published: November 10, 2026

Copyright © 2026 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
http://creativecommons.org/licenses/by/4.0/

Open Access

Abstract

Introduction: The global fight against HIV infection among children still stands as a challenge worldwide. Globally, vertical HIV transmission is 9%, but Africa accounts for 90% of all infections. In 2018, the mother-to-child transmission (MTCT) rate for Kenya was 11.5%, accounting for 8.9% of the global vertical transmission. **Objectives:** The objective of this study was to determine maternal and facility-level factors influencing enrolment time for early infant diagnosis services at Mama Lucy Kibaki Hospital (MLKH) in Nairobi, Kenya. **Materials and Methodology:** The study adopted a cross-sectional study design on HIV-exposed infants enrolled at Mama Lucy Kibaki Hospital. Systematic random sampling was used to select 153 HIV-exposed infants. Qualitative data were transcribed, entered, coded, and thematically analysed using NVivo, and presented using emerging themes. The quantitative data analysis was done using STATA version 14. The quantitative data were descriptively analysed using measures of central tendency (mean, mode and median), proportions, and percentages. The quantitative data were further analysed using inferential statistics (Chi-square) to assess the association of the independent and dependent variables. Logistic regression was used to analyse quantitative data at the bivariate level. **Results:** A total of 153 HIV-exposed infants enrolled in receiving EID services at MLKH; 14 (9.2%) infants were enrolled after 6 weeks which was considered a delay in the EID services. At a 95% confidence level p-value (0.05), Fisher's exact test showed that marital status, occupation and household income (0.016), (0.001) and (0.010), respectively, were significant. At the p-value (0.05), the Binary logistic regression showed that the mothers who were diagnosed HIV positive during the time of childbirth and during breastfeeding were more likely to delay in en-

rolment than those who were diagnosed before becoming pregnant with [OR = 3.530 (95% CI 0.004 - 1.077), p = 0.044] and [OR = 2.089 (95% CI 0.001 - 0.979), p = 0.009]. **Conclusion:** The study corroborates that women who were late diagnosed HIV positive during their period of pregnancy were more likely to bring their infants late to Early Infant Diagnosis (EID) care which is a risk of HIV transmission from the mother to the child.

Keywords

HIV-Exposed Infants, Early Infant Diagnosis, Vertical Transmission, Maternal

1. Introduction

Globally, HIV transmission from mother to child is a great challenge. It accounts for 90% of HIV infections among all infected children less than 15 years old [1]-[3].

MTCT occurs during pregnancy, childbirth and breastfeeding, though it is only 5% during pregnancy and labour and 18% during breastfeeding [4]-[6]. The EID program comes in to prevent MTCT during breastfeeding and improve infant survival. Delayed enrolment of infants in the EID program is a global challenge that results in late diagnosis and treatment and results in the death of infants from HIV-related causes [3] [7]. Delayed enrolment is defined as initiation of infants born from mothers with HIV into care at more than 6 weeks of life. These infants are at high risk of acquiring HIV from their mothers and are recommended to receive dual prophylaxis with Zidovudine (AZT) twice daily and Nevirapine (NVP) once daily at birth as regarded as timely enrolment.

A study that was done by the Ministry of Health (MOH) in Mozambique found that only 66% of HIV-exposed infants (HEIs) were enrolled in EID within 6 weeks of age, with several factors contributing to it [8]. Lost-to-follow-up, healthcare worker challenges and long waiting times were some of the determinants of EID. Benin in west Africa had 64.9% of HEIs enrolled in the EID program, Cote d'Ivoire was 56.3% and Uganda in eastern Africa was 44.8% while DRC, Nigeria and Guinea were less than the others [9]. A study in Ethiopia found that place of birth and LTFU had a significant effect on the time of EID enrolment [10].

Africa accounts for 90% of infants born to mothers living with HIV [11]. Kenya's national ART guidelines adopted the use of EID recommendations by WHO [12]. A study in Kenya using the 2006-2008 data from the Kenya National Institute for Health (NIH) showed that only 68% of HEIs were enrolled in the program within 6 weeks of age [3] [13].

This study aims to further investigate determinants of delayed enrolment among HEIs in the EID program at MLKH, Nairobi among the HIV-exposed infant population.

2. Methodology

2.1. Study Design

A cross-sectional study design was adopted using a mixed methods approach where qualitative and quantitative data was collected and analysed.

2.2. Study Site

A study was conducted at Mama Lucy Kibaki Hospital (MLKH), a government hospital in the Eastland of Nairobi city.

2.3. Study Population

The study population was all infants who were born to mothers living with HIV, currently enrolled at the Mama Lucy Kibaki Hospital EID register.

2.4. Sampling and Sample Size Determination

The Cochran formula was used for sample size calculation. A 95% confidence level with 5% as the tolerable error and the 68% proportion of HEIs who were timely enrolled in EID in Kenya, was substituted in the formula [14]-[16]. After the calculations, a systematic random sampling was used to select 153 HEIs. For the in-depth interviews, a healthcare provider; three nurses, two clinicians and two mother mentors who were running the EID clinic were all interviewed.

2.5. Data Collection Tools

Pre-test semi-structured interviews were administered a questionnaire containing 4 parts was developed. An In-depth interview guide to understand how the health facility contributed to the late enrolment of HEIs was used.

2.6. Data Analysis

The quantitative data entry, cleaning, coding, and analysis were done using STATA Version 14. Descriptive statistics (frequency, proportion and measures of central tendency) were used to summarize the data. Fisher's exact test and regression were used to analyze the data at the bivariable and multivariable levels, respectively. All analyses were done at a 95% confidence level.

The study outcome was to determine the Maternal and Facility Level Factors Influencing Enrolment Time for Early Infant Diagnosis Services. This was done by categorising the infants enrolled at birth and before the age of 6 weeks as enrolled in time and the ones after 6 weeks of age as late enrolled.

Qualitative data were entered using the NVIVO software which was then presented thematically by describing emerging themes obtained from the healthcare workers working at the EID clinic.

2.7. Ethical Consideration

Ethical approval was sought from Jomo Kenyatta University of Agriculture and Technology Institutional Research Ethical Committee (IREC) JKU/ISERC/02316/

0824.

The research permit was sought from the National Commission for Science, Technology & Innovation, NACOSTI/P/23/24655.

The permission was also sought from the Nairobi County Ministry of Health through the Medical Superintendent and its research committee of Mama Lucy Kibaki Hospital. Risks, benefits, confidentiality and voluntary participation were clearly explained. Written and informed consent was obtained and duly signed by the study participants.

3. Results

3.1. Quantitative Data

3.1.1. Sociodemographic Characteristics of Respondents

The majority fall between the age group of 25 - 34 with a median age of 29.5 years. Approximately 83.0% were married with only 8.5% single mothers. Most of the mothers (49.0%) formally employed. Most of the mothers had a guardian, out of the 153 mothers at least 84 (54%) had a husband as their guardian. Almost all mothers attended school with only 2 (1.3%) who did not attend and the majority of the mothers (60.1%) with secondary school level (15.7%) were women who went far up to primary level and 35 (22.9%) were women who went far up to tertiary level (see Table 1).

Table 1. Demographic data.

Maternal characteristics n = 153	Frequency	Percent (%)	Mean ± (SD)	SEM
Age			**2.163 (±0.654)**	**0.053**
18 - 24	20	13.1		
25 - 34	90	58.8		
35 - 49	41	26.8		
Above 49	2	1.3		
Respondent's Marital Status			**2.020 (±0.479)**	**0.039**
Single	13	8.5		
Married	127	83.0		
Separeted	10	6.5		
Widowed	3	2.0		
Religion of Respondent			**1.974 (±0.160)**	**0.013**
Muslim	12	2.6		
Christianity	141	97.4		
Educational Level of Respondent			**3.046 (±0.662)**	**0.054**
No school attended	2	1.3		
Primary	24	15.7		

Continued

Secondary	92	60.1		
Tertiary	35	22.9		
Next of Kin			**3.753 (±1.011)**	**0.082**
No guardian	34	22.2		
Friend	8	5.2		
Husband	84	54.9		
Other relatives	27	17.6		
Occupation of Respondents			**2.680 (±1.158)**	**0.094**
House wife	16	10.5		
Business	62	40.5		
Employed	75	49.0		

3.1.2. HIV Disclosure

Most of the mother (85%) disclosed their HIV status to their husband. Almost half of the mothers (56.2%) disclosed their HIV status to their relatives (see Figure 1).

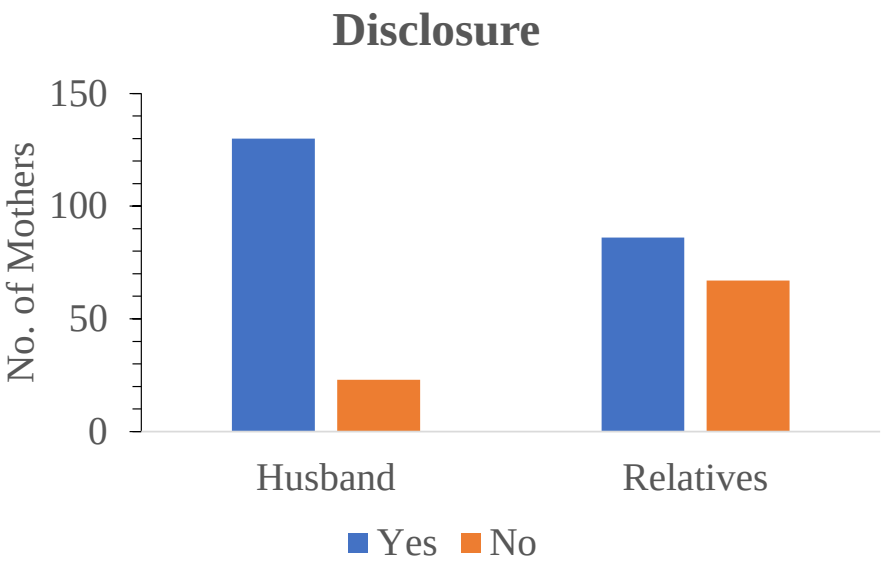


Figure 1. Disclosure status on HIV among respondents.

3.1.3. Time of HIV Diagnosis

At least 55.6% of the mothers were diagnosed HIV positive before they got pregnant. 30.7% of the mothers were diagnosed HIV positive during the time of pregnancy. There were 3.3% of mothers who were diagnosed HIV positive during the time of delivery. At least 10.5% of the mothers were diagnosed as HIV-positive during the time of breastfeeding (see Figure 2).

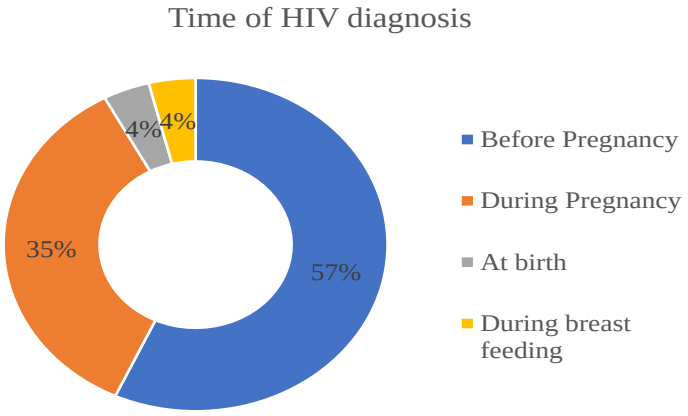


Figure 2. The time HIV testing was done on the mother of the HEI.

3.1.4. Gestation Age at 1st PMTCT/ANC Visit

Most of the mothers (79.1%) attended the PMTCT/ANC visit during their first trimester of this baby (**Figure 3**). At least 3.3% of mothers attended the PMTCT/ANC visit in the second trimester. At least 3.9% of mothers attended the PMTCT/ANC visit in the third trimester. At least 13.7% of the mothers attended the PMTCT/ANC visit after giving birth (**Table 2**).

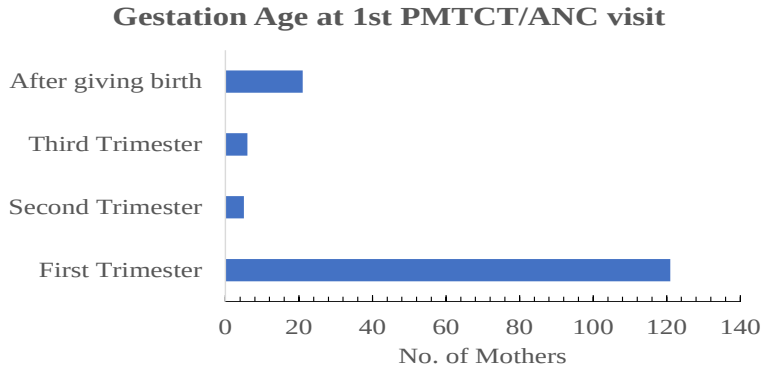


Figure 3. Gestation age for this HEI at the first time of PMTCT.ANC visit.

3.1.5. The Proportion of Infants Enrolled in Care

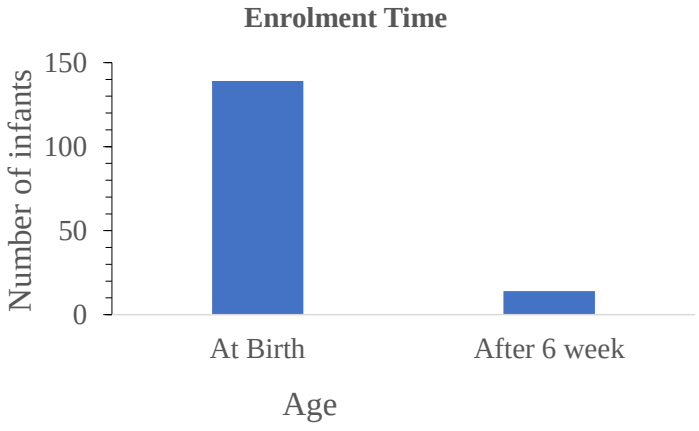


Figure 4. The time HEI was enrolled for EID services.

9.2% of infants were enrolled after 6 weeks, which was considered a delay in EID services (see Figure 4).

3.1.6. Factors Associated with Delayed Enrolment

1. Sociodemographic characteristics and other maternal characteristics in association with the enrolment in the EID program

The association of individual values between maternal sociodemographic characteristics and the enrolment time in the EID services was measured using chi-square and Fisher exact test as some cells had expected counts less than five. At 95% confidence level p-value of 0.05, the Fisher's exact test values for several social demographic variables were significant including marital status, occupation and household income (0.016), (0.001) and (0.010) respectively (see Table 2).

On the maternal side, the age of gestation at the first PMTCT/ANC visit influenced the time of enrolment in the EID clinic (p = 0.000). The time of HIV diagnosis and the time of initiating the ART to the mother influenced the time of enrolment in the EID program (p = 0.000) and (p = 0.001) respectively. Mothers disclosing their HIV status to either their husbands or other relatives influenced infant enrolment in the EID program (p = 0.002) and (p = 0.045) respectively (see Table 2).

Table 2. The association of individual factors and the time of HEI enrollment for EID services.

Social Demographic characteristics				
Age	0.5	0.764	0.661	2
Marital Status	7.3	0.007	**0.016**	1
Religion	0.0	0.919	1.000	1
Education Level	6.4	0.093	0.110	3
Guardian Status	7.5	0.059	0.061	3
Occupation	14.1	0.001	**0.001**	2
Household income	71.4	0.007	**0.010**	3
Maternal factors				
First PMTCT/ANC visit	71.9	0.000	**0.000**	4
Time of HIV Diagnosis	93.3	0.001	**0.001**	3
Time of ART initiation	93.3	0.000	**0.000**	3
Disclosure to Husband	29.3	0.015	**0.002**	1
Disclosure to other relatives	4.8	0.029	**0.045**	1
Place of ANC delivery	2.2	0.325	0.322	2
Place of delivery	0.9	0.624	0.551	2

2. Binary logistics regression on maternal factors associated with EID enrolment time

The regression model was run using STATA to find factors that are associated with the time of enrolment in the EID services among infants. There were four variables (marital status, number of PMTCT/ANC visits, time of HIV diagnosis, disclosure status and time of ART initiation) that were significant at a p-value of 0.05. The mothers who were married [OR = 0.468 (95% CI 0.006 - 0.324), p = 0.012] were less likely to be delayed in the enrolment than single mothers. The mothers who had who attended four, three and two PMTCT/ANC visits were less likely to delay in enrolment than those who attended one PMCTC/ANC visit with [OR = 0.800 (95% CI 0.001 - 0.188), p = 0.004], [OR = 0.347 (95% CI 0.003 - 0.395), p = 0.009] and [OR = 0.473 (95% CI 0.010 - 0.190), p = 0.011] respectively. Mothers who were diagnosed HIV positive during the time of childbirth and during breastfeeding were more likely to delay in enrolment than those who were diagnosed before becoming pregnant with [OR = 3.530 (95% CI 0.004 - 1.077), p = 0.044] and [OR = 2.089 (95% CI 0.001 - 0.979), p = 0.009] respectively. The mothers who disclosed their HIV status to their husbands [OR = 0.313 (95% CI 00.049 - 2.000), p = 0.019] were less likely to be delayed in the enrolment than the mothers who did not disclose their HIV status. The mothers who were initiated on ART before becoming pregnant [OR = 0.313 (95% CI 00.049 - 2.000), p = 0.019] were less likely to be delayed in the enrolment than mothers who were initiated on ART after giving birth (see Table 3).

Table 3. The Binary logistic regression on maternal factors associated with EID enrolment time.

Covariate	Odds Ratio	p value	95% CI
Q3Marital_Status			
Single	**Ref**		
Married	0.468	**0.012**	0.006 - 0.324
Education Level			
Primary			
Secondary	4.459	0.263	0.326 - 61.010
Tertiary	33.935	0.122	0.388 - 29.676
Number of PMTCT/ANC visits			
One	**Ref**		
Two	0.473	**0.011**	0.010 - 0.190
Three	0.347	**0.009**	0.003 - 0.395
Four	0.800	**0.004**	0.001 - 0.188
Five	7.464	0.148	0.239 - 13.813
Occupation			
Housewife	**Ref**		
Business	12.300	0.165	0.356 - 42.493
Employed	1.112	0.951	0.037 - 33.076

Continued

Household income in Ksh			
<6000	**Ref**		
12,001 - 18,000	2.667	0.548	0.108 - 65.682
>18,000	0.333	0.554	0.009 - 12.644
Time of HIV diagnosis			
Before Pregnancy	**Ref**		
During Pregnancy	0.154	0.284	0.005 - 4.748
At birth	3.530	**0.044**	0.004 - 0.677
During breast feeding	2.089	**0.009**	0.001 - 0.979
HIV disclosure to Husband			
No	**Ref**		
Yes	0.313	**0.019**	0.049 - 0.451
Time of ART initiation			
After giving birth	**Ref**		
Before Pregnancy	0.006	**0.014**	0.001 - 0.356
First Trimester	0.033	0.064	0.001 - 1.215
Socond Trimester	0.171	0.296	0.006 - 4.678
Third Trimester	0.071	0.621	0.008 - 2.465

3.2. Qualitative Findings

3.2.1. Social Demographic Characteristics of Qualitative Study Participants

To understand the hospital-level factors influencing the delayed enrolment at MLKH, a qualitative research method was conducted. The healthcare providers at MLKH PMTC/EID clinic were interviewed using an in-depth interview guide and saturation was reached at 6 participants (see Table 4).

Table 4. Social Demographic characteristics of respondents.

Participants ID	Gender	Years of experience	Higher qualification	Certified provider	Carder
P1	Female	5	Certificate	No	Mother Mentor
P2	Female	7	Diploma in Nursing	Yes	Nurse
P3	Male	13	Diploma in Clinical Medicine	Yes	Clinian
P4	Female	8	Diploma in Clinical Medicine	Yes	Clician
P5	Female	6	Certificate	No	Mother Mentor
P2	Female	9	Diploma in Nursing	Yes	Nurse

3.2.2. Thematic Areas Assessed

The data was analysed using Nvivo and the following thematic areas were assessed:

- Human resource factors
- Medical supplies availability
- Organization of services
- Referral mechanism
- Attitude toward clients

1. Theme one: Human resource factors

The healthcare providers working at the PMTCT/EID clinic were interviewed using an in-depth interview guide and some of the word were coated.

"*It is not all the departments at this hospital that we are trained on this service delivery. You might find some of the department's only one person is trained on PMTCT/EID and sometimes not at all.*"

"*We usually struggle tracking the HIV Exposed Infants once the HIV status was unknown the time of delivery or if the mother just come at our facility for delivery and ANC services were done in other facilities. I will talk on my side, as a mother mentor, we are only two mothers' mentors and imagine as I am talking my colleague is on annual leave.*" … a female mother mentor with 6 years' experience participant.

2. Theme two: Medical supplies

It was another theme that was reported as one of the factors contributing to the delayed enrolment among infants in the EID services. The term "drug stockout" was reported many times by the healthcare worker. The issue of drug stockout though is not a common one but it was reported to be at the beginning of the year 2023.

"*You know Mama Lucy is a referral hospital, so most of the time the mother who attended ANC somewhere else apart from here might present without nevirapine prophylaxis. This might be due to stockout of the nevirapine from their facility.*" … a female mother mentor with 5 years' experience participant.

"*Usually, we don't have those scenarios. The only time I remember it was the era of covid* 19 *when we had short supply but not really for nevirapine.*" … … a female clinician with 8 years' experience participant.

"*Sometimes we experience the stock out of the prophylaxis so the mother might go home without the medication and come after delivery.*" ... a female clinician with 9 years' experience participant.

"*At the beginning of this year, as a country, we were struck badly with COVID-*19 *so I could suggest that was the problem that brought a shortage of medical supplies including the DBS test kit, ART syrup prophylaxis and adult ART.*" … a female mother mentor with 6 years' experience participant.

"*The challenge of drug supply was there, we could even share one bottle with two mothers so that they come again next time to refill their ART hoping the drugs will be available by then.*" … a female nurse with 7 years' experience participant.

3. Theme three: Organization of services

The mother once known to be pregnant is supposed to receive the ART at the PMTCT/EID clinic till the baby is born then the baby is enrolled into care. The mother is given scheduled visits of one month up to six months depending on the bottle of ART supply.

"*Sometimes you find that a mother has manipulated the written results of HIV test in their Health passport book not to be known as HIV positive person even changing the book will make a healthy person miss the clients. Sometimes when the mothers have delivered, they dodge HIV testing and even miss it then they come to the hospital after seeing the baby is sick then you find out that both the mother and the baby are positive or only the mother is positive. After probing more, the mother then might be open reviewing herself being on ART from a certain hospital but she stopped by choice. Mothers sometimes are missed at the PMTCT clinic, it happens that a mother is pregnant for* 7 *or* 8 *months and has sent a guardian for the ART. It easy for this mother to miss collecting ART for her baby within the* 6 *weeks of life.*" … a male clinician with 13 years' experience participant.

"*The system might fail us sometimes, talking of two mother mentors might sound to be enough but when it comes to having defaulters then now tracing comes a challenge. Our tracing system is not good enough, resource shortage being one of the reasons.*" … a female mother mentor with 6 years' experience participant.

4. Theme four: Referral mechanism

The facility of MLKH is a referral hospital and received several clients from level 3 and 4 hospitals. Again within the facility, the clients are being referred to *PMTCT/EID clinic*. Much interest was referral within the facility as all intransit infants were excluded in this study.

"*PMTCT|EID are all offered at one place, the only challenge we have is a woman being referred from CCC to PMTCT|EID clinic, sometimes we fair to link these women in time.*" … a female mother mentor with 6 years' experience participant.

"*We miss clients pregnant mothers here, a woman will appear for the first PMTCT|EID clinic while in the third trimester or after giving birth because our referral system is not so good.*" … a female clinician with 8 years' experience participant.

"*You know Mama Lucy is a referral hospital, so most of the time the mother who attended ANC somewhere else apart from here might present without nevirapine prophylaxis. Therefore, in the labour ward, the healthcare provider attending to this pregnant mother might overlook the issue of Nevirapine syrup.*" … a female nurse with 9 years' experience participant.

"*I would suggest that women are supposed to be escorted from where they are being referred. I am saying this from experience, a woman can be seen at*

the Outpatient department and then referred for PMTCT/EID services but these women do not show up. Usually, they are tired of long queues at OPD and they have the same impression that is the same thing this side." … a female nurse with 7 years' experience participant.

5. Theme five: Attitude of healthcare providers toward clients

The word "attitude" was widely reported by a good number of healthcare providers. This attitude was reported as how some healthcare workers express towards HIV-positive mothers when they are receiving the services.

"*Sometimes the attitude of the healthcare worker contribute a lot. For example, a pregnant mother or an infant mother came to the clinic and this woman is not on ART. For the Healthcare worker regarding that there are high chances for the baby to contract HIV, He/She might over react frustrating the mother. The mother might be psychologically disturbed and not willing to comeback again.*" ... a female clinician with 8 years' experience participant.

"*I do understand that some healthcare worker has bad attitude and judgmental once someone is HIV Positive and can affect the care because most of the time these clients' needs love and caring.*" … a female mother mentor with 6 years' experience participant.

"*Sometimes the attitude of the healthcare workers contributes to loss of interest for the HIV services.*" … a female clinician with 8 years' experience participant.

4. Discussions

The study provided a detailed qualitative and quantitative assessment of the factors that influenced the infants' enrollment time for EID services, either at birth, the recommended time, or after 6 weeks. The 14 (9.2%) infants out of 153 were enrolled after 6 weeks which was considered a delay to the EID services. The proportion is quite bigger compared to the study which was conducted in Rwanda on the impact of maternal ART on mother-to-child transmission (MTCT) of HIV at six weeks postpartum. In the study in Rwanda, 97.4% (95.8 - 98.4) of infants received antiretroviral prophylaxis within 6 weeks of life, meaning it was 2.6% who were enrolled [17] [18].

The highest proportion group of the study participants was aged 25 - 34 (IQR=27 - 37). The results were similar to the study in South Africa, which had a median age of 31 years (IQR: 28 - 36). The majority (83.0%) of the women reported being married. The results are almost similar to the study which was done in Nairobi, Kenya, whereby the majority, 85.28% of the study participants, were married [7].

The mothers (OR = 2.089, 95% CI 0.001 - 0.979, p = 0.009) diagnosed HIV positive during breastfeeding and mothers diagnosed during delivery (OR = 3.530, 95% CI 0.004 - 1.077, p = 0.044) had their babies delayed in EID enrollment, ending up missing the dual ART prophylaxis. Similarly, a study by Mutanga *et al.* (2020) reported that the mothers who were diagnosed HIV positive during the

time of giving birth and the postnatal period had five times the odds of their babies testing HIV positive as they presented after six weeks for EID services missing the ART dual protection as well [19].

The mothers who disclose their HIV/AIDs status to their husbands (OR = 0.313, 95% CI: 0.049 - 2.000, p = 0.019) were less likely to enrol their babies after 6 weeks of life. A study conducticted in Malawi reviewed that male partners disclosed their HIV status to their female partners about 30% - 50% less frequently than the reverse and this also affect EID services consumption among women [20] [21]. Disclosure of the HIV status of the mother is associated with stigma. The healthcare workers reportedly the term "stigma" as one of the factors contributing to the late enrolment in the EID. Through the in-depth interviews to try to understand the hospital factors, most of the healthcare provider reported several factors for the maternal side highlighting that it is not their side but usually it is the maternal side. The disclosure of the HIV status directly and sometimes indirectly influences the time of EID enrolment. A similar study result in Uganda reports that women have a fear of attending HIV-related services because they are afraid of people pointing them out as sick people with HIV [22].

5. Limitations

This study had some limitations. The respondents who participated in this study relied upon their scheduled visits to appointments and most of them missed their appointments. This challenge it happened to finish the data collection longer not as planned. The other challenge was on the language barrier as the questionairres were in English and the responders would misinterpret the questions. Despite the limitations, in order not to lose the important information there were study participants who were native language to interpret the questions to those who were not clear.

6. Conclusions

If the fight against HIV infection does not start with preventing new HIV infections among infants born to mothers living with HIV, it may not be possible to win. The HIV progression in infants is very bad, and if there is no proper and prompt intervention, almost half the infants die before their second birthday. This is a clear indication to make sure the infants are taken care of and make sure they get the EID services in time to prevent further transmission of HIV.

This study identifies factors that are associated with the delay of EID services to infants born from the mother who are living with HIV. This delay of the services leaves the infants in a situation whereby they are missing the dual ARV that are offered in the early days of their lives.

Acknowledgements

First and foremost, let me glorify the almighty God for the good health and everything that he made it possible for me to reach this juncture with my paper. Let

me express my sincere gratitude to my supervisors, Dr. Elizabeth Kiilu and Prof. Kenneth Ngure, for the guidance and technical support throughout my research paper. Special thanks to Prof Gideon Kikuvi for the guidance and support as the PI of the SCEPRESSA project. I appreciate my classmate, my roommate, data collector and fellow friends from PAUSTI for taking part in my research project. Finally, I appreciate my family for the effortless support in all dimensions throughout my studies and the development of this paper.

Author Contributions

Timothy Justus Chilombe developed the concept, analysed the data and developed the manuscript. Prof. Keneth Ngure and Dr. Elizabeth Mueke Kiilu critically reviewed and recommended the work. The review and comment to the document was from the development of the concept up to the final document of the paper.

Conflicts of Interest

The authors declare no competing interests.

References

[1] WHO (2025) Mother-to-Child Transmission of HIV. https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/hiv/prevention/mother-to-child-transmission-of-hiv

[2] World Health Organization (2017) Global Guidance on Criteria and Processes for Validation: Elimination of Mother-to-Child Transmission of HIV and Syphilis. 2nd Edition, World Health Organization. https://iris.who.int/handle/10665/259517

[3] Gaitho, D., Kinoti, F., Mwaniki, L., Kemunto, D., Ogoti, V., Njigua, C., *et al.* (2021) Factors Associated with the Timely Uptake of Initial HIV Virologic Test among Hiv-Exposed Infants Attending Clinics within a Faith-Based HIV Program in Kenya; A Cross-Sectional Study. *BMC Public Health*, **21**, Article No. 569. https://doi.org/10.1186/s12889-021-10587-1

[4] NIH (2023) Preventing Perinatal Transmission of HIV after Birth. https://hivinfo.nih.gov/understanding-hiv/fact-sheets/preventing-perinatal-transmission-hiv-after-birth

[5] Hunduma, F., Gebrehanna, E. and Adugna Debela, F. (2021) Determinants of Mother-to-Child Transmission of HIV in Public Hospitals of West Shewa Zone, Central Ethiopia: Case-Control Study. *HIV/AIDS—Research and Palliative Care*, **13**, 435-443. https://doi.org/10.2147/hiv.s299585

[6] Tuthill, E.L., Odhiambo, B.C. and Maltby, A.E. (2024) Understanding Mother-to-Child Transmission of HIV among Mothers Engaged in HIV Care in Kenya: A Case Report. *International Breastfeeding Journal*, **19**, Article No. 14. https://doi.org/10.1186/s13006-024-00622-3

[7] Elizabeth, K.M., Gideon, K., Peter, W. and John, G. (2020) Determinants of HIV Positive Status at First PCR Test among Infants Seeking Early Infant Diagnosis (EID) Services in Selected Hospitals in Nairobi County, Kenya. *African Journal of Health Sciences*, **34**, 406-420.

[8] Vieira, L., Mahumane, A.M., Napua, M., Chale, F., Manuel, J.L., Cowan, J.G., *et al.* (2020) HIV-Exposed Infant Follow-Up in Mozambique: Formative Research Find-

ings for the Design of a Cluster Randomized Controlled Trial to Improve Testing and ART Initiation. *BMC Health Services Research*, **20**, Article No. 226. https://doi.org/10.1186/s12913-020-5051-8

[9] Simmonds, F.M., Cohn, J.E., Mafaune, H.W., Nyamundaya, T.H., Mahomva, A. and Chadambuka, A. (2020) Task Shifting for Point-of-Care Early Infant Diagnosis: A Comparison of the Quality of Testing between Nurses and Laboratory Personnel in Zimbabwe. *Human Resources for Health*, **18**, Article No. 4. https://doi.org/10.1186/s12960-020-0449-2

[10] Kebede, B., Gebeyehu, A., Jain, S., Sun, S. and Haubrich, R. (2014) Delay in Early Infant Diagnosis and High Loss to Follow-Up among Infant Born to HIV-Infected Women in Ethiopia. *World Journal of AIDS*, **04**, 402-412. https://doi.org/10.4236/wja.2014.44048

[11] UNAIDS (2025) Africa Prepares to Eliminate Mother-to-Child Transmission of HIV by 2015. https://www.unaids.org/en/resources/presscentre/featurestories/2010/may/20100526pmtct

[12] Hassan, A.S., Sakwa, E.M., Nabwera, H.M., Taegtmeyer, M.M., Kimutai, R.M., Sanders, E.J., *et al.* (2012) Dynamics and Constraints of Early Infant Diagnosis of HIV Infection in Rural Kenya. *AIDS and Behavior*, **16**, 5-12. https://doi.org/10.1007/s10461-010-9877-7

[13] Finocchario-Kessler, S., Gautney, B., Cheng, A. and Wexler, C. (2018) Evaluation of the HIV Infant Tracking System (HITSystem) to Optimise Quality and Efficiency of Early Infant Diagnosis: A Cluster-Randomised Trial in Kenya. *The Lancet HIV*, **5**, e696-e705.

[14] Peltzer, J.N., Ogawa, L., Tusher, S., Farnan, R. and Gerkovich, M.M. (2017) A Qualitative Description of HIV-Infected African American Women's Experiences of Psychological Distress and Their Coping Strategies. *Journal of the Association of Nurses in AIDS Care*, **28**, 226-237. https://doi.org/10.1016/j.jana.2016.09.010

[15] Peltzer, K., Weiss, S.M., Soni, M., Lee, T.K., Rodriguez, V.J., Cook, R., *et al.* (2017) A Cluster Randomized Controlled Trial of Lay Health Worker Support for Prevention of Mother to Child Transmission of HIV (PMTCT) in South Africa. *AIDS Research and Therapy*, **14**, Article No. 61. https://doi.org/10.1186/s12981-017-0187-2

[16] Jung, S. (2014) Stratified Fisher's Exact Test and Its Sample Size Calculation. *Biometrical Journal*, **56**, 129-140. https://doi.org/10.1002/bimj.201300048

[17] Mugwaneza, P., Lyambabaje, A., Umubyeyi, A., Humuza, J., Tsague, L., Mwanyumba, F., *et al.* (2018) Impact of Maternal ART on Mother-to-Child Transmission (MTCT) of HIV at Six Weeks Postpartum in Rwanda. *BMC Public Health*, **18**, Article No. 1248. https://doi.org/10.1186/s12889-018-6154-6

[18] Guidelines, Standards & Policies Portal. http://guidelines.health.go.ke/#/

[19] Mutanga, J.N., Mutembo, S., Ezeamama, A.E., Song, X., Fubisha, R.C., Mutesu-Kapembwa, K., *et al.* (2019) Long-Term Survival Outcomes of HIV Infected Children Receiving Antiretroviral Therapy: An Observational Study from Zambia (2003-2015). *BMC Public Health*, **19**, Article No. 115. https://doi.org/10.1186/s12889-019-6444-7

[20] Bedell, R.A., van Lettow, M. and Landes, M. (2014) Women's Choices Regarding HIV Testing, Disclosure and Partner Involvement in Infant Feeding and Care in a Rural District of Malawi with High HIV Prevalence. *AIDS Care*, **26**, 483-486. https://doi.org/10.1080/09540121.2013.841830

[21] Nyandat, J. and Van Rensburg, G. (2017) Non-Disclosure of HIV-Positive Status to

a Partner and Mother-to-Child Transmission of HIV: Evidence from a Case-Control Study Conducted in a Rural County in Kenya. *Southern African Journal of HIV Medicine*, **18**, a691. https://doi.org/10.4102/sajhivmed.v18i1.691

[22] Naigino, R., Makumbi, F., Mukose, A., Buregyeya, E., Arinaitwe, J., Musinguzi, J., *et al.* (2017) HIV Status Disclosure and Associated Outcomes among Pregnant Women Enrolled in Antiretroviral Therapy in Uganda: A Mixed Methods Study. *Reproductive Health*, **14**, Article No. 107. https://doi.org/10.1186/s12978-017-0367-5